FIPS 201 Evaluation Program -
PIV Card Test Procedure

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1 Overview

Homeland Security Presidential Directive-12 (HSPD-12) - "*Policy for a Common Identification Standard for Federal Employees and Contractors*" directed the promulgation of a new Federal standard for a secure and reliable form of identification issued by all Federal Agencies to their employees and contractors.

In addition to derived test requirements developed to test conformance to the NIST standard, GSA has established interoperability and performance metrics to further determine product suitability. Vendors whose products and services are deemed to be conformant with NIST standards and the GSA interoperability and performance criteria will be eligible to sell their products and services to the Federal Government.

1.1 Identification

This document provides the detailed test procedure that needs to be executed by the Lab in order to evaluate the PIV Card (henceforth referred to as the Product) against the subset of applicable requirements that need to be electronically tested for this category.

2 Testing Process

As previously mentioned, this document prescribes detailed test steps that need to be executed in order to test the requirements applicable for this category. Please note that conformance to the tests specified in this document will not result in the Product being compliant to the applicable requirements of FIPS 201. The Product must undergo an evaluation using all the evaluation criteria listed for that category prior to being deemed as compliant. Only products and services that have successfully completed the entire Approval Process will be designated as conformant to the Standard. To this effect, this document only provides details for the evaluation using the Lab Test Data Report approval mechanism.

A Lab Engineer follows the steps outlined below in order to test those requirements that have been identified to be electronically tested. The end result is a compilation of the observed behavior of the Product in the Lab Test Data Report.

Section 3 provides the test procedures that need to be executed for evaluating the Product as conformant to the requirements of FIPS 201.

3 Test Procedure for PIV Card

3.1 Requirements

The following table provides a reference to the requirements that need to be electronically tested within the Lab as outlined in the Approval Procedures document for the Product. The different test cases that are used to check compliance to the requirements is also cross-referenced in the table below.

Req. #	Requirement Description	Source	Test Case #
PIV-C.19	Cards shall not malfunction after hand cleaning with a mild soap and water mixture.	FIPS 201, Section 4.1.3	PIV-C-TP.1
PIV-C.20	The reagents called out in Section 5.4.1.1 of [ISO10373] shall be modified to include a two percent soap solution.	FIPS 201, Section 4.1.3	PIV-C-TP.1
PIV-C.21	Cards shall not delaminate after hand cleaning with a mild soap and water mixture.	FIPS 201, Section 4.1.3	PIV-C-TP.1
PIV-C.29	The card material shall allow production of a flat card in accordance with [ISO7810] after lamination of one or both sides of the card.	FIPS 201, Section 4.1.3	PIV-C-TP.2
PIV-C.44	The PIV Card shall implement RSA private key cryptographic operations.	FIPS 201, Section 4.3	PIV-C-TP.3
PIV-C.67	At a minimum, PIV Cards shall support either the T=0 or T=1 transmission protocol as defined in ISO/IEC 7816-3:1997. The card may support both protocols	Card /Card Reader Interoperability Requirements, Section 2.1.1.3	PIV-C-TP.4
PIV-C.68	PIV Cards shall not require the use of any RFU bits in the Global or Specific Interface Bytes to operate correctly.	Card /Card Reader Interoperability Requirements, Section 2.1.1.4	PIV-C-TP.4
PIV-C.69	Retrieval time of the CHUID through the contactless interface of the card shall not exceed 1.0 seconds.	Card /Card Reader Interoperability Requirements, Section 3.1.1.1	PIV-C-TP.5

PIV-C.70	Retrieval time of the biometric fingerprints through the contact interface of the card shall not exceed 1.0 seconds.	Card /Card Reader Interoperability Requirements, Section 3.1.2.1	PIV-C-TP.4
PIV-C.72	PIV cards shall support the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.	Card /Card Reader Interoperability Requirements	PIV-C-TP.6
PIV-C.73	PIV Cards submitted for testing shall contain the 5 mandatory objects on the contact ICC, which have been retrieved from the EP Website. Objects to be loaded are: 1. Card Capabilities Container 2. CHUID 3. PIV Authentication Certificate 4. Biometric Fingerprints 5. Security Object	Derived Requirement	PIV-C-TP.4

Table 1 - Applicable Requirements

3.2 Test Components

3.2.1 Baseline Configuration

The baseline configuration describes initial state of the Card Reader Test Fixture and its associated components. A Lab Engineer commences execution of this test procedure after performing the necessary updates to the baseline configuration based on the requirements of the test cases described below.

The Card Reader Test Fixture includes the following components as part of its baseline configuration:

1. Test Fixture Software – The test software that contains, in the configuration file, the hexadecimal representation of the five mandatory data objects which have been downloaded from the following site: *<URL to be referenced when available>*
2. The Host System – It includes the workstation and the Test Application software and the drivers for CLREADER and CREADER.
3. Breakout Box – The USB and Serial Communication cables from the breakout box are connected to the Host System.

Figure 1 provides an illustration of the baseline configuration for the Card Reader Test Fixture.

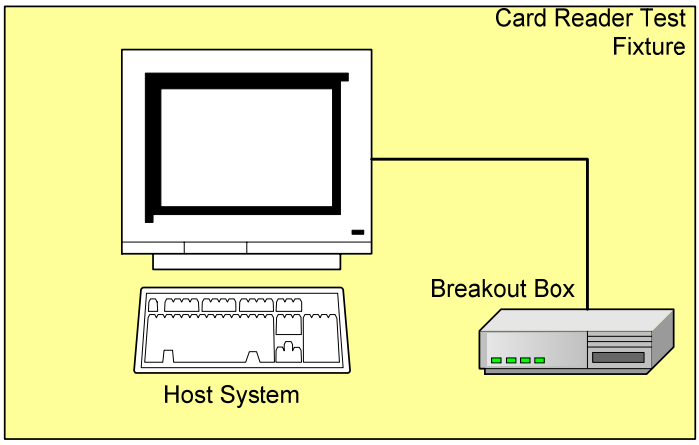


Figure 1 - Card Reader Test Fixture Baseline Configuration

3.2.2 Components Details

Table 2 provides the details of all the components required by the Lab to execute this test procedure. Based on the different test cases, different components may be required to execute the test case.

#	Component	Component Details	Identifier
1	The Card Reader Test Fixture	-	CRTF
2	CHUID Reader (Contact)	TBD	CREADER
3	CHUID Reader (Contactless)	TBD	CLREADER
4	Generic Smart Card Reader	TBD	GENREADER
5	The PIV Card being tested	-	PROD
6	A metric ruler longer than 10 centimeters	-	RULER

Table 2 - Test Procedure: Components

3.3 Test Cases

This section discusses the various test cases that are needed to test the Product against the requirements mentioned above.

3.3.1 Test Case PIV-C-TP.1

3.3.1.1 Purpose

The purpose of this test is to verify that the card does not malfunction after hand washing the card in a soap and water solution. The test will also verify that the card does not delaminate after washing.

3.3.1.2 Test Setup

Equipment:	The following components are necessary for executing this test case: ▪ One gallon bucket ▪ Measuring cup ▪ Tablespoon ▪ Water ▪ Mild dish soap (e.g. Dawn, Joy, Palmolive, etc) ▪ Mixing spoon ▪ Towel ▪ PROD ▪ CRTF ▪ CREADER
Preparation:	▪ Measure eight (8) cups of water and pour into the one gallon bucket. ▪ Pour three (3) tablespoons of dish soap into the bucket and mix.

3.3.1.3 Test Process

Test Steps:	1. Hand wash PROD by gently rubbing the card while it is submerged in the soapy water solution. Wash for approximately 30 seconds. 2. Using the towel, pat PROD completely dry. 3. Allow remaining moisture to evaporate by letting the card air out for 10 minutes. 4. Execute the Test Application on the CRTF. 5. Make sure that the details of CREADER are entered into the Test Application using the File → Edit Reference Reader Implementation Info. 6. Select the tab for the "PIV Card". This selects the test for the PIV Card in the Test Application. 7. Fill in all the information as required in the screen for the testing PROD as shown in Figure 3. 8. In the test application, select the Test Case radio button corresponding toTest Case PIV-C-TP. 9. Insert PROD into CREADER. 10. Click on the "Execute Test" button. Follow the steps on the screen. 11. Verify that the test was completed by reviewing the result on the

	screen.
Expected Result(s):	1. The test completes successfully showing that the PIV Card is able to be read after hand washing in a soapy water solution.

3.3.2 Test Case PIV-C-TP.2

3.3.2.1 Purpose

The purpose of this test is to verify that the production of the card has resulted in a flat card in accordance with [ISO7810] after lamination of one or both sides of the card.

3.3.2.2 Test Setup

Equipment:	The following components are necessary for executing this test case: ▪ PROD
Preparation:	▪ No preparation is necessary for this scenario.

3.3.2.3 Test Process

Test Steps:	1. Examine the laminated card that has been submitted by the lab. Look for bending or warping of the card, specifically around the gold contact. 2. Verify whether the card submitted seems to be in good condition. 3. In the test application, select the Test Case radio button corresponding to Test Case PIV-C-TP.2. 4. Check the appropriate box to verify whether a manual visual inspection of the card has revealed the card to be flat and in good condition.
Expected Result(s):	1. The Lab Engineer reports that the submitted PIV Card has been laminated and is flat and in good condition.

3.3.3 Test Case PIV-C-TP.3

3.3.3.1 Purpose

The purpose of this test is to verify that the submitted PIV Card implements RSA cryptographic operations using the private key.

3.3.3.2 Test Setup

Equipment:	The following components are necessary for executing this test case: ▪ CRTF ▪ PROD

	▪ CREADER
Preparation:	▪ With the PIV Card inserted into GENREADER, fire the SP 800-73 Card Command APDU, Generate Asymmetric Key Pair (0047009A). ▪ Retain the public key which has been displayed in the response from the card. This key will be used in the decrypt operation.

3.3.3.3 Test Process

Test Steps:	1. In the test application, select the Test Case radio button corresponding to Test Case PIV-C-TP.3 2. Insert PROD into CREADER. 3. Click on the "Execute Test" button. Follow the steps on the screen. 4. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	1. The test completes successfully showing that the card has encrypted a cryptographic challenge using the private key on the card. The encrypted data is then able to be successfully decrypted using the public key, proving that the card implements cryptographic operations.

3.3.4 Test Case PIV-C-TP.4

3.3.4.1 Purpose

The purpose of this test is to verify the contact-based interoperability requirements for the PIV Card. More specifically the test verifies the following:

- If PIV Cards supports either the T=0 or T=1 transmission protocol as defined in ISO/IEC 7816-3:1997.
- If the PIV Cards requires the use of any RFU bits in the Global or Specific Interface Bytes to operate correctly.
- The retrieval time for the fingerprint biometric through the contact interface of the card does not exceed 1.0 seconds.
- The data retrieved through the contact interface is identical to the data that was expected to be received.

3.3.4.2 Test Setup

Equipment:	The following components are necessary for executing this test case: ▪ CRTF ▪ PROD ▪ CREADER

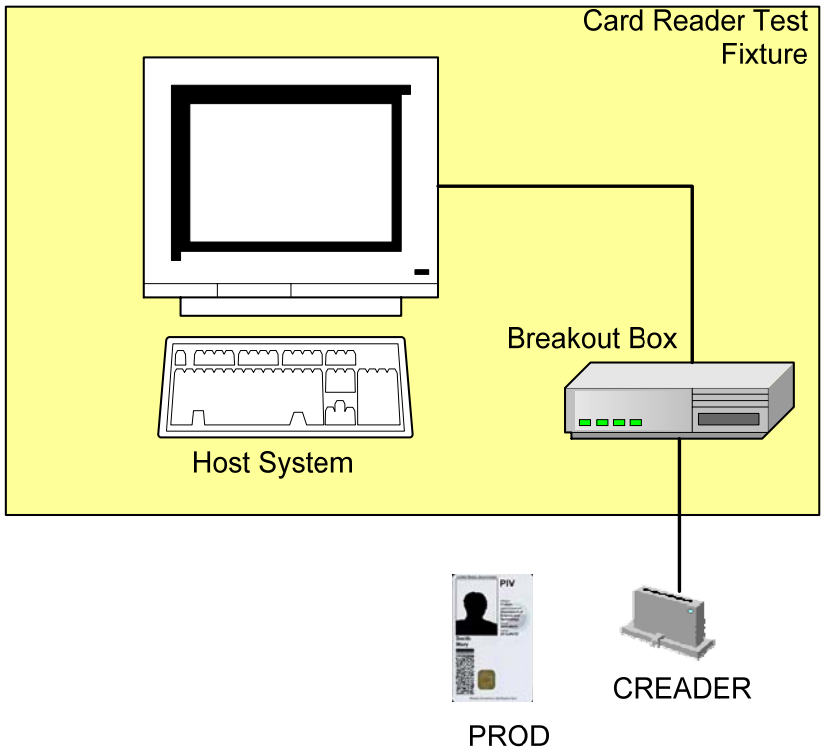
Configuration Diagram:	
Preparation:	▪ Connect the CREADER into the appropriate port in the breakout box of the CRTF. ▪ Verify that the CREADER is correctly installed by reviewing its presence in list of hardware using the device manager of the host system. ▪ Using the data downloaded from the EP website (http://fips201ep.cio.gov/documents/aplData.zip), load the <*configuration file*> with all five objects.

Figure 2 - Configuration Diagram for Test Case PIV-C-TP.4

3.3.4.3 Test Process

Test Steps:	1. Select the Test Case radio button corresponding to Test Case PIV-C-TP.4. 2. Insert PROD into CREADER. 3. Click on the "Execute Test" button. Follow the steps on the screen. 4. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	1. The test completes successfully showing that: ▪ The PIV Card supports either the T=0 or T=1 transmission protocol as defined in ISO/IEC 7816-3:1997. ▪ The PIV Card does not use any RFU bits in the Global or

	Specific Interface Bytes to operate correctly. ▪ The retrieval time for the fingerprint biometric through the contact interface of the card does not exceed 1.0 seconds. ▪ The data that was retrieved from the card matches the data that was expected to be retrieved.

3.3.5 Test Case PIV-C-TP.5

3.3.5.1 Purpose

The purpose of this test is to verify the contactless interoperability requirements for the PIV Card. More specifically, the test verifies the following:

- The retrieval time for the CHUID data through the contactless interface of the card does not exceed 1.0 seconds.

3.3.5.2 Test Setup

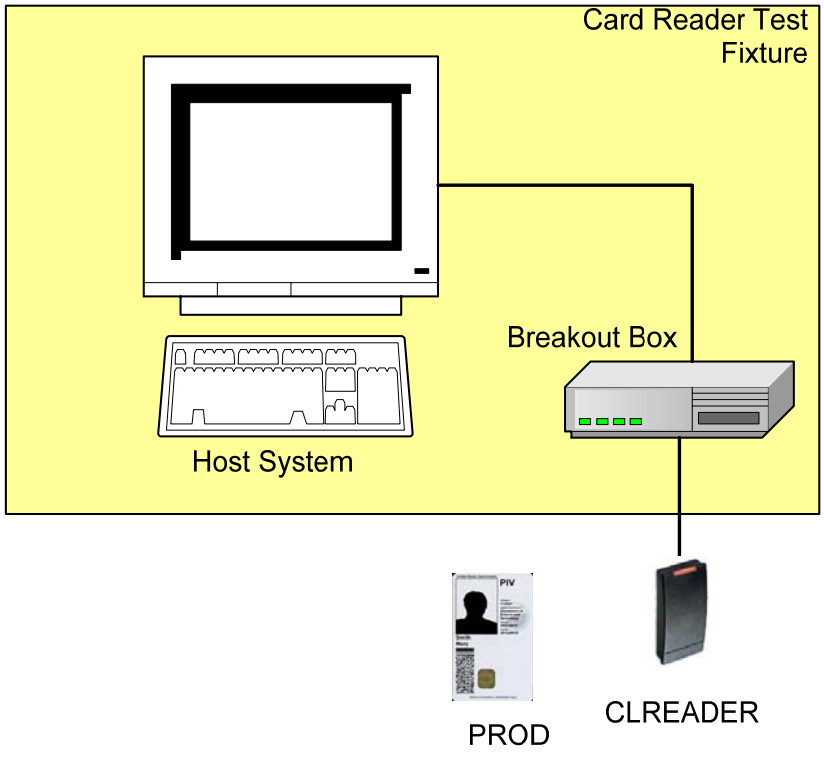
Equipment:	The following components are necessary for executing this test case: ▪ CRTF ▪ PROD ▪ CLREADER ▪ RULER
Configuration Diagram:	

Figure 3 - Configuration Diagram for Test Case PIV-C-TP.5

Preparation:	▪ Connect the CLREADER into the appropriate port in the breakout box of the CRTF. ▪ Verify that the CLREADER is correctly installed by reviewing its presence in list of hardware using the device manager of the host system.

3.3.5.3 Test Process

Test Steps:	1. Select the Test Case radio button corresponding to Test Case PIV-C-TP.5. 2. Make sure that the details of CLREADER are entered into the Test Application using the File → Edit Reference Reader Implementation Info. 3. Bring the PROD within 10 centimeters of the CLREADER (Make sure the distance is measured with RULER). 4. Click on the "Execute Test" button. Follow the steps on the screen. 5. Verify that the test was completed by reviewing the result on the screen. 6. Once the results have been populated in the Test Results area, click on the "Show Test Report" button. The Test Results screen is displayed. 7. Click on the "Print Report" button to print a copy of the test results for PROD.
Expected Result(s):	1. The test completes successfully for showing that: ▪ The retrieval time for the CHUID data through the contactless interface of the card does not exceed 1.0 seconds. ▪ The data that was retrieved from the card matches the data that was expected to be retrieved.

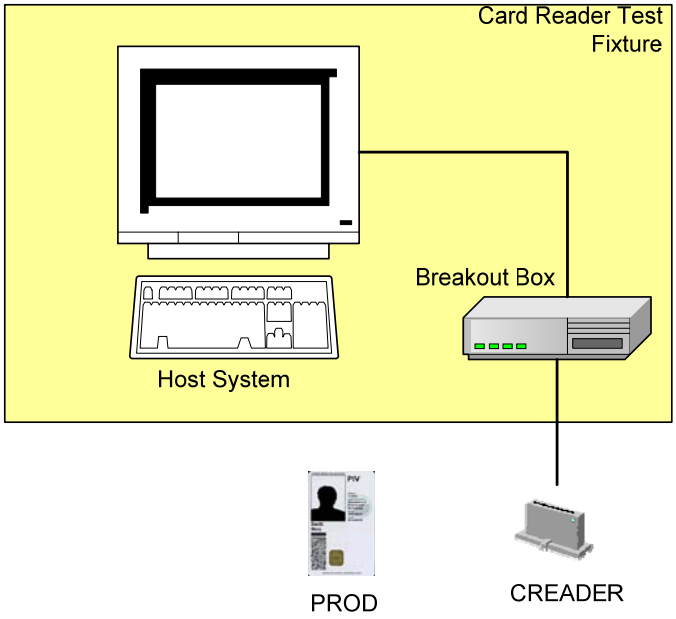
3.3.6 Test Case PIV-C-TP.6

3.3.6.1 Purpose

The purpose of this test is to verify that the PIV Card supports the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.

3.3.6.2 Test Setup

Equipment :	The following components are necessary for executing this test case: ▪ CRTF ▪ CREADER ▪ PROD

Configuration Diagram:	 **Figure 4 - Configuration Diagram for Test Case PIV-C-TP.6**
Preparation:	▪ No further configuration necessary to test this scenario.

3.3.6.3 Test Process

Test Steps:	1. Select the Test Case radio button corresponding to Test Case PIV-C-TP.6. 2. Insert PROD into CREADER. 3. Click on the "Execute Test" button. Follow the steps on the screen. 4. Verify that the test was completed by reviewing the result on the screen.
Expected Result(s):	1. The test completes successfully showing that the PIV Card supports Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.

4 PIV Card Test Application Screens

4.1 Testing Screen

The following represents a screen shot of the Test Application that is used when testing a PIV Card. The Lab Engineer is expected to manually provide the information for **PIV Card Product Information**, **Tester Information,** and **Test Case Selection** when completing testing.

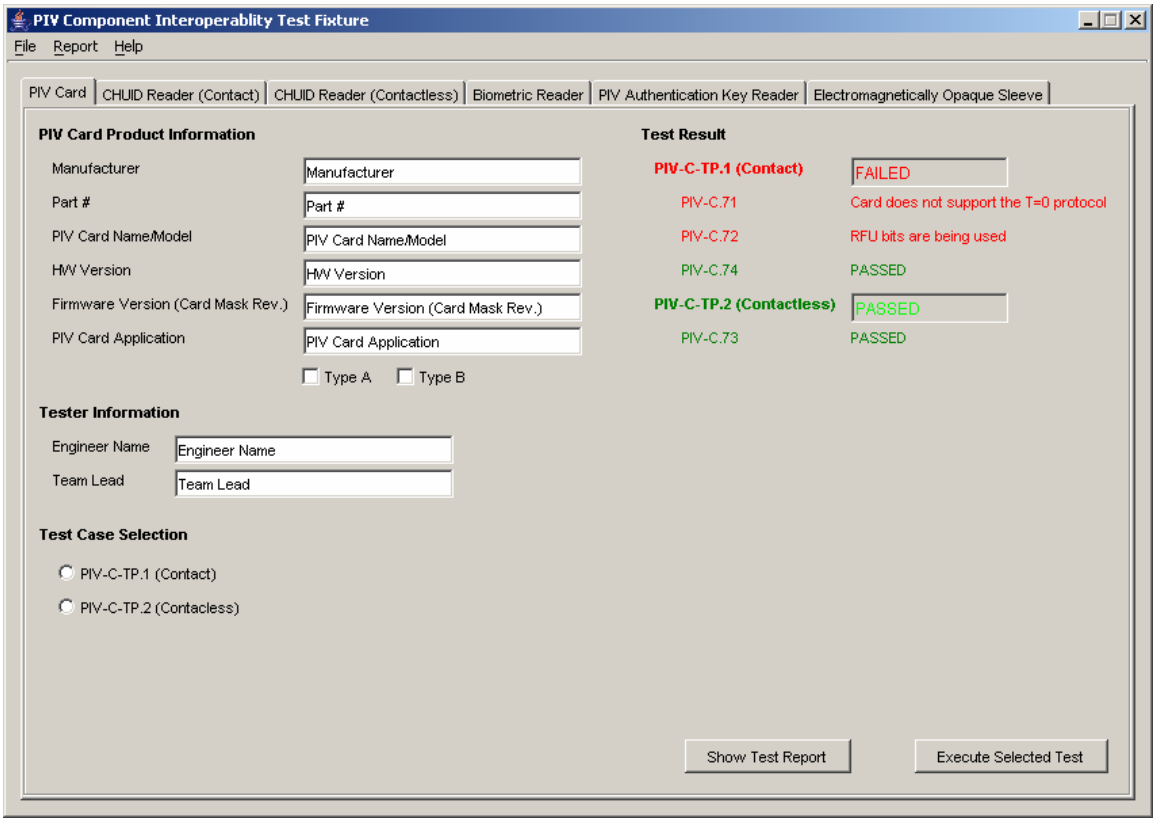


Figure 5 - Testing Screen for the PIV Card

4.2 Test Report Screen

The following represents a screen shot of the test report that is generated by the Test Application after the PIV Card testing has been completed. It provides the Lab Engineer with a reference of what to expect as a result of successful execution of the test procedure. A Lab Engineer is not expected to fill out any portion of the report manually.

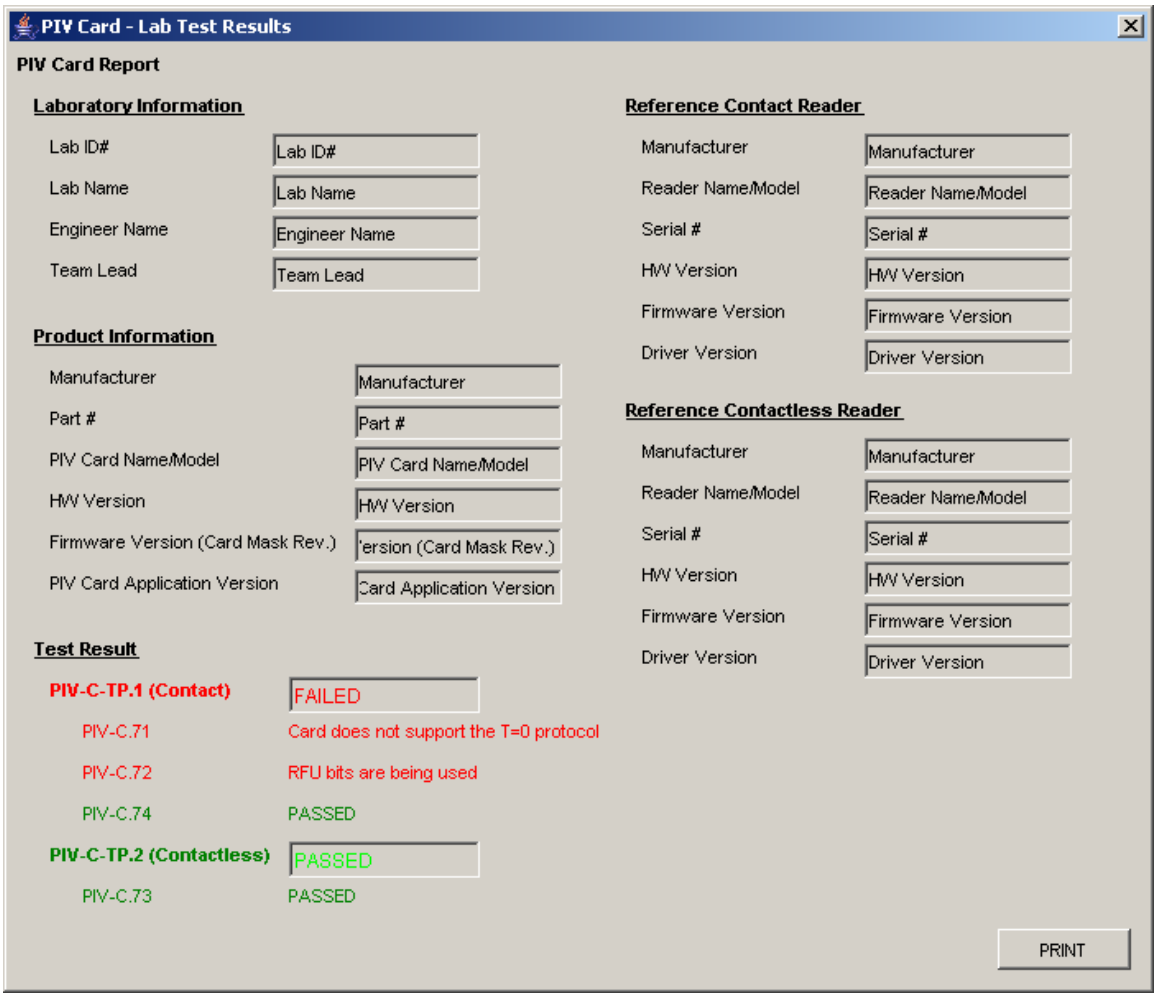


Figure 6 - Test Report for the PIV Card